(No Model.) 4 Sheets—Sheet 1.

H. A. SAGE.

AUTOMATIC RAILWAY SWITCH.

No. 393,666. Patented Nov. 27, 1888.

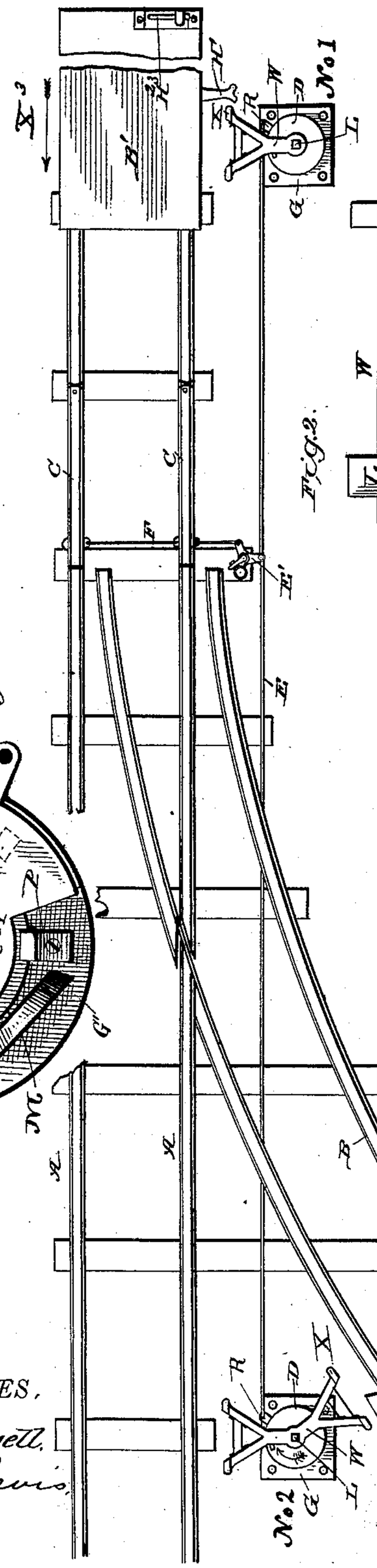

Fig. 1.

Fig. 2.

Fig. 3.

WITNESSES,

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(No Model.) 4 Sheets—Sheet 2.

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Fig. 4.

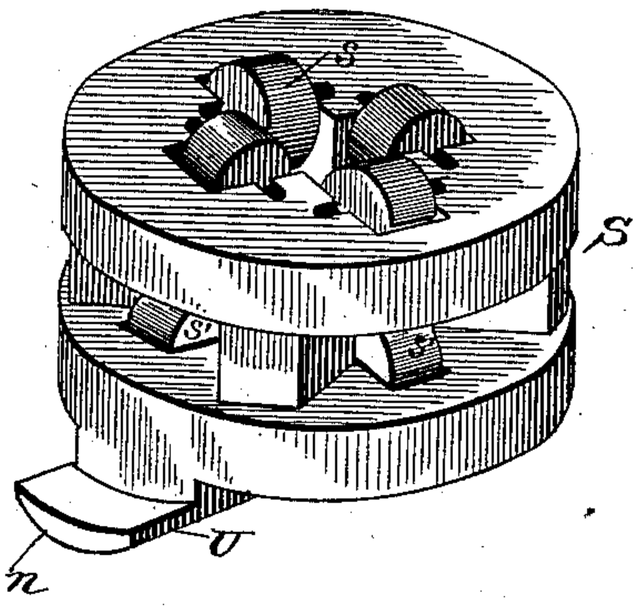


Fig. 5.

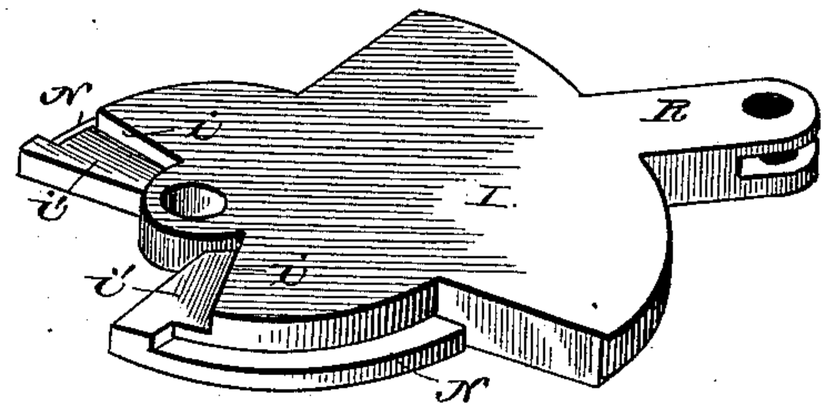


Fig. 6.

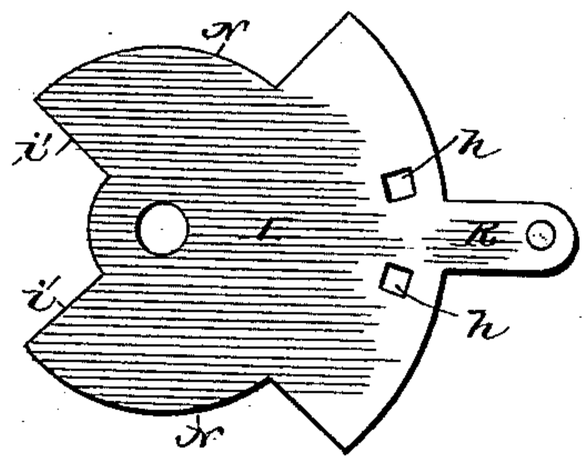


Fig. 7.

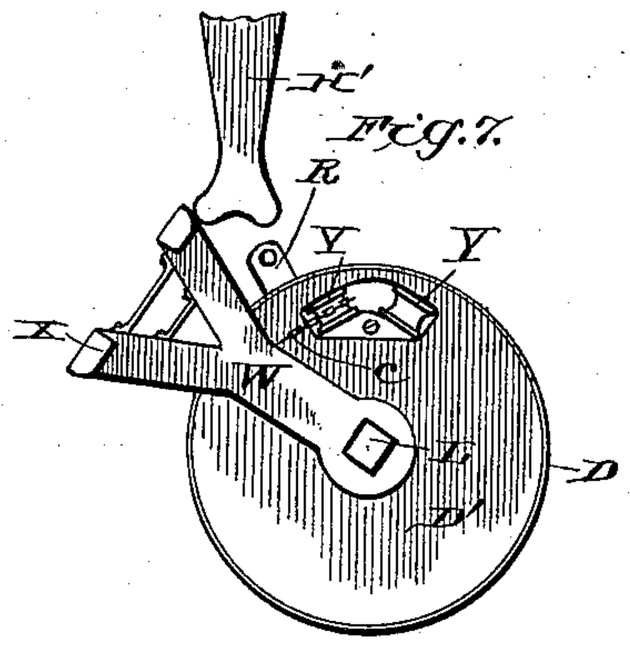
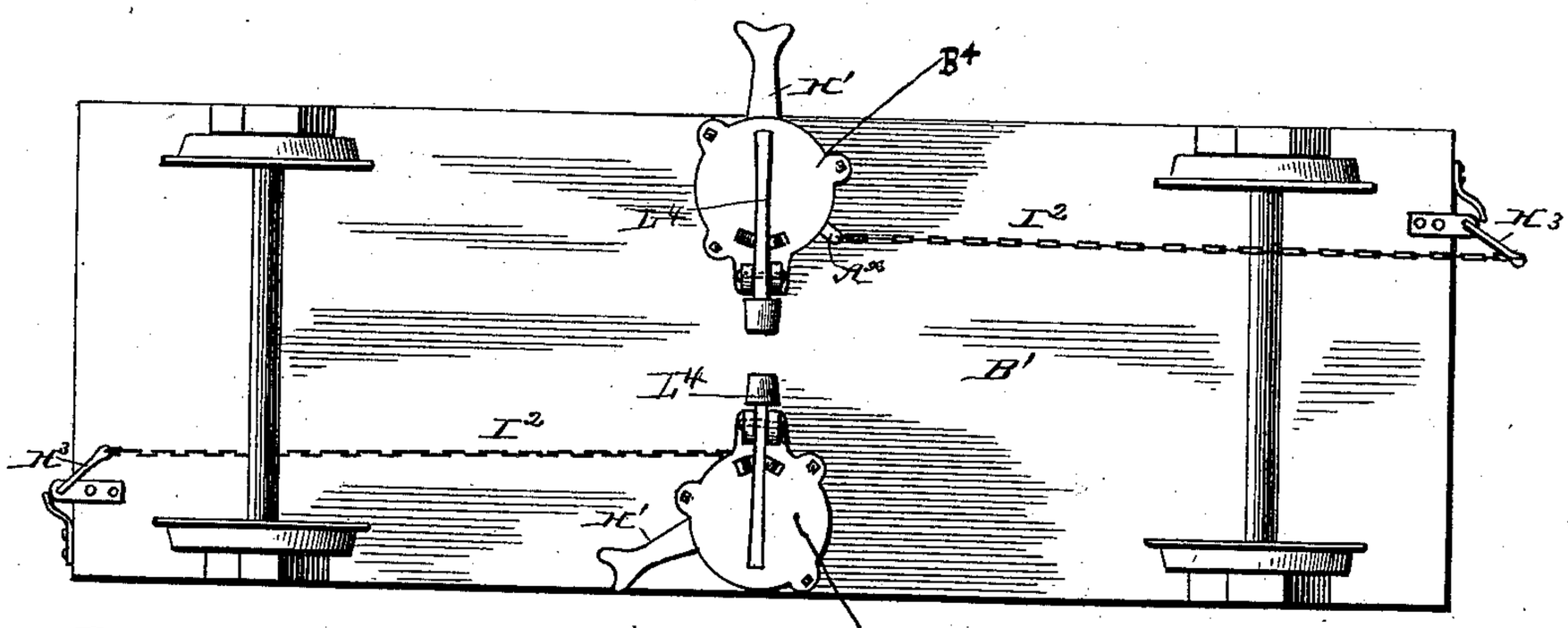


Fig. 8.



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(No Model.) 4 Sheets—Sheet 3.

H. A. SAGE.

AUTOMATIC RAILWAY SWITCH.

No. 393,666. Patented Nov. 27, 1888.

Fig. 9.

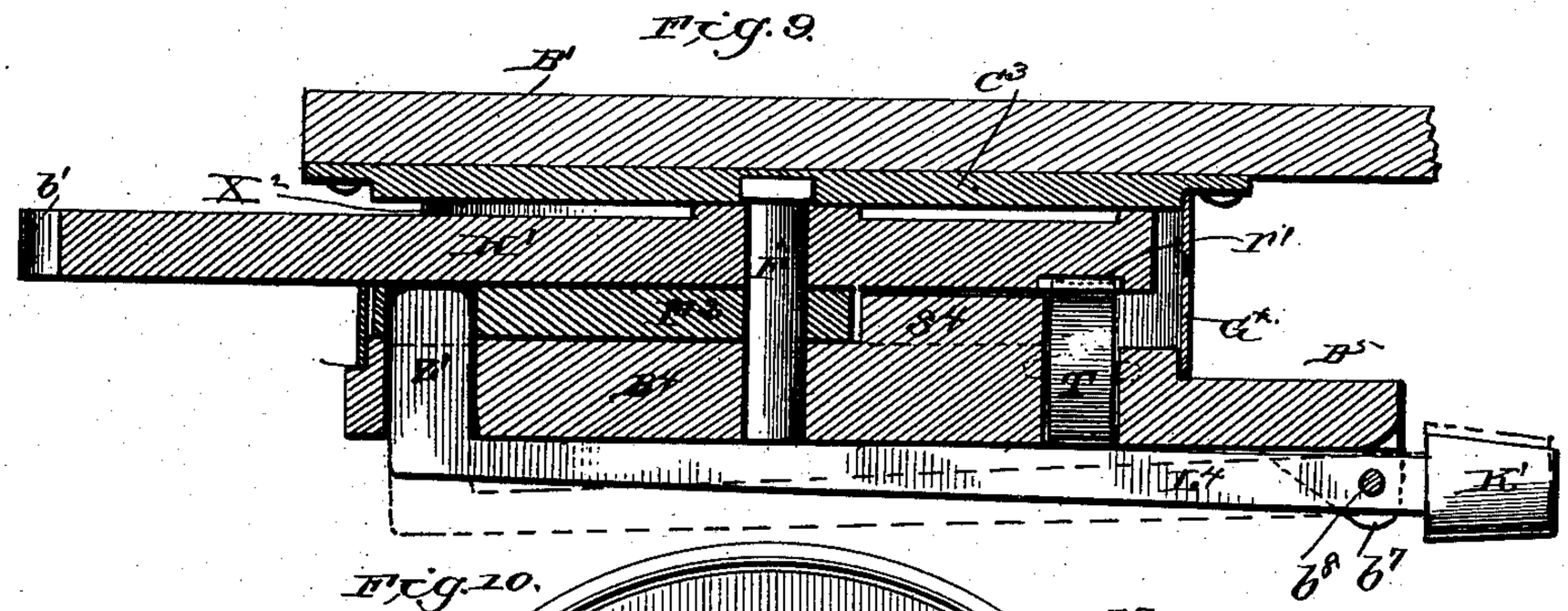


Fig. 10.

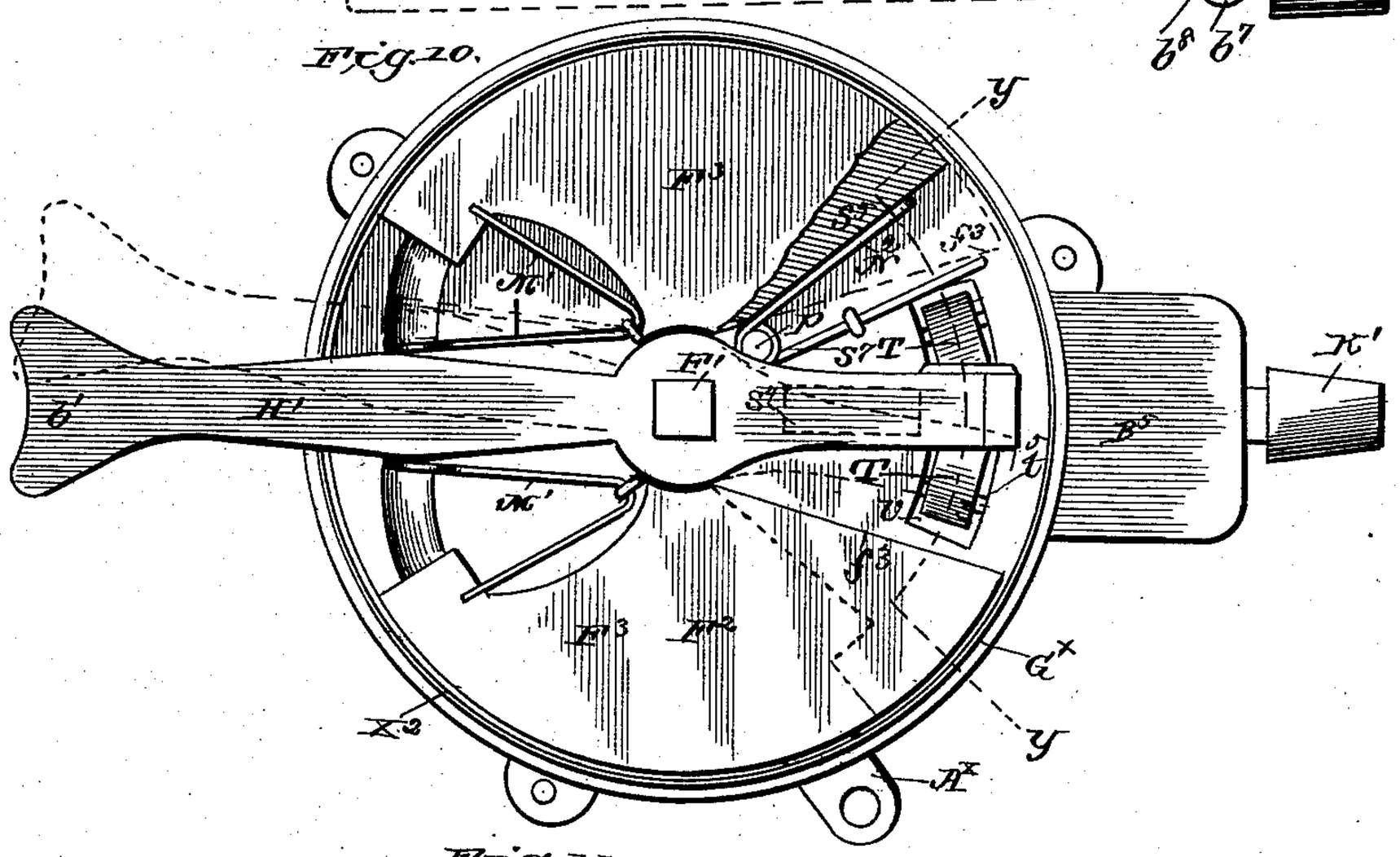
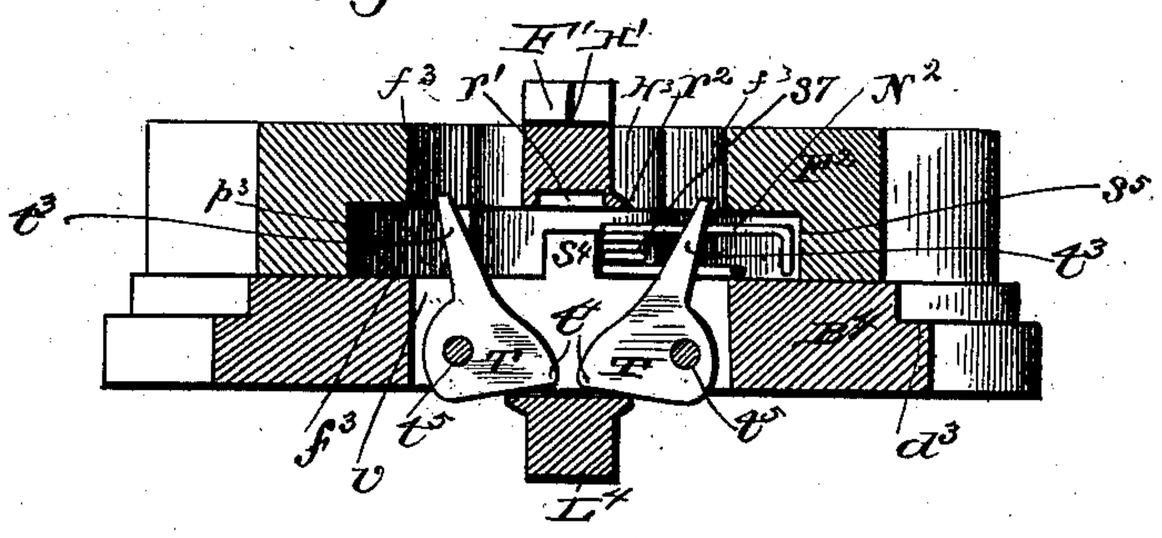


Fig. 11.



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H. A. SAGE.

AUTOMATIC RAILWAY SWITCH.

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Fig. 12.

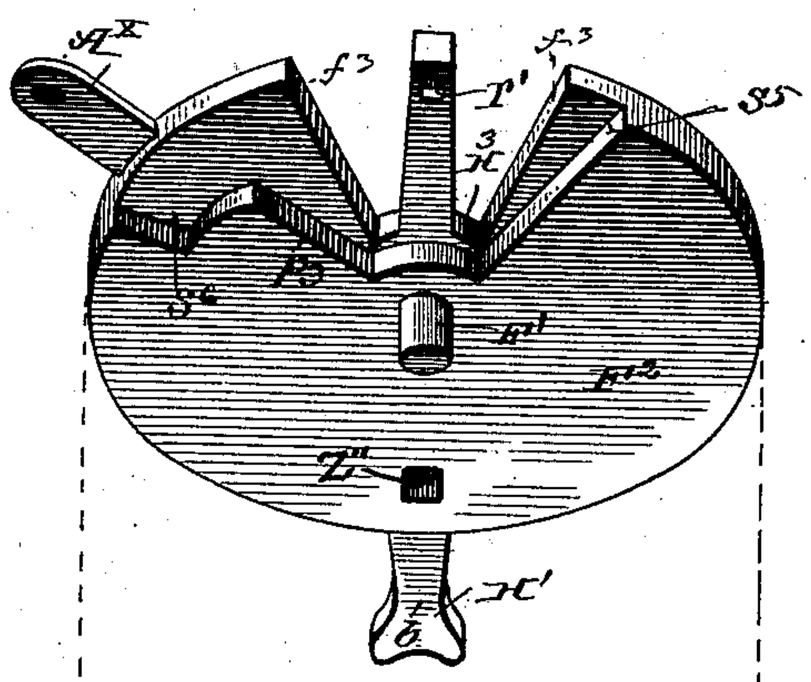
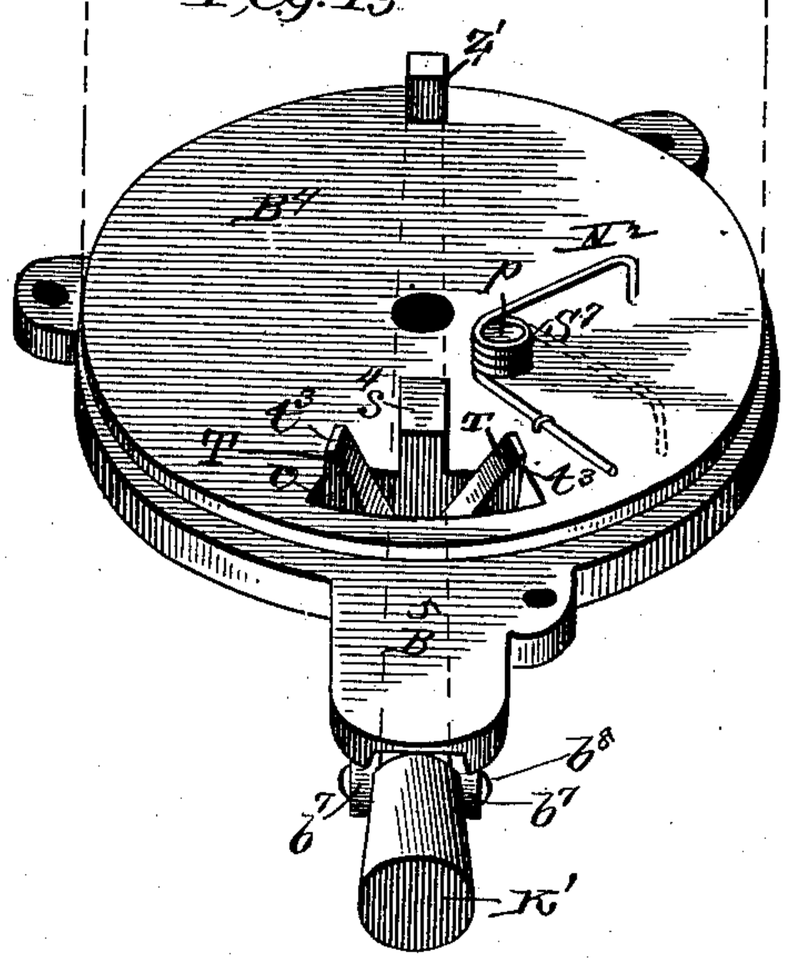


Fig. 13.



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UNITED STATES PATENT OFFICE.

HARMAN A. SAGE, OF AURORA, DAKOTA TERRITORY.

AUTOMATIC RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 393,666, dated November 27, 1888.

Application filed December 15, 1887. Serial No. 258,000. (No model.)

To all whom it may concern:

Be it known that I, HARMAN A. SAGE, a citizen of the United States, residing at Aurora, in the county of Brookings and Territory of Dakota, have invented certain new and useful Improvements in Automatic Railway-Switches, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain improvements in mechanism by which the switch-rails of a railroad-track can be positively operated and properly adjusted automatically, the ground mechanism, which is in direct connection with the free ends of the switch-rails, being actuated by an arm adapted to be protruded from the side of a railroad-car or locomotive-tender, which arm is under control of either the engineer or the brakeman.

The following description, when taken in connection with the annexed drawings, will enable others skilled in the art to fully understand my improvements.

In the annexed drawings, Figure 1 represents a plan view of a section of a railroad and car with my improvements applied thereto, the switch-rails being adjusted in line with the main track; Fig. 2, a vertical sectional view of one of the ground or track devices for operating the switch-rails, the parts being shown in their normal position; Fig. 3, a horizontal sectional view of the same, taken on the line *x x* of Fig. 2, the parts being shown in the same position; Fig. 4, a perspective view of a vertically-movable turn-table or carriage mounted upon a vertical shaft in the device shown in Fig. 2, and adapted to operate an oscillating plate, and also the locking-lever which engages with the same; Fig. 5, a perspective view of the said oscillating plate, which is connected to and operates the switch-rails; Fig. 6, a bottom view of this plate; Fig. 7, a plan view of the devices shown in Fig. 2, and a portion of an arm attached to the bottom of a railway-car, the said arm being shown in the act of operating the said devices; Fig. 8, a bottom view of a railway-car or tender with the spring-actuated operating-arms and devices for operating the same applied thereto, the arm on one side of the car being withdrawn and the one on the other side being projected; Fig. 9, a vertical central section of one of the devices on the car for operating the switch mechanism, the operating-arm being protruded ready for operating; Fig. 10, a detached plan view of the same, the upper plate, C^3, being removed; Fig. 11, a sectional view on the line *y y* of Fig. 10; Fig. 12, a perspective view of the under side of the oscillating disk F^2 for operating the operating-arm on the car, and Fig. 13 a perspective view of the upper side of the stationary plate on which the said disk oscillates.

The object of the invention is to provide improved and simple means for automatically and positively adjusting the movable switch-rails of an ordinary switch without stopping or slacking the speed of the train or requiring the attendance of a switchman, this being accomplished by an arm adapted to be protruded from the side of a passing car and adapted to operate the rail shifting devices located upon the ground at the side of the track, as will be more fully hereinafter set forth.

Referring to the annexed drawings by letter, A designates the main rails of the track, B the rails of a siding, and C the laterally-movable switch-rails, all of which may be arranged in the usual well-known manner. On one side of the main track and at a suitable distance from the switch-rails I locate the devices or mechanism for shifting the switch-rails, these devices being connected to the shifting-rod F by means of the angle-lever E′ and the rod E, as shown in Fig. 1. In practice I prefer to provide means for shifting the switch-rails by hand in addition to and independent of the means for automatically shifting them.

The rail-shifting devices and the rod E are preferably incased to protect them from injury. Each rail-shifting mechanism is inclosed in a vertical cylinder, D, rigidly secured to a base, G, suitably anchored to the ground in proper relation to the main track. The upper end of each cylinder is provided with a stationary head, D′, perforated centrally for the free passage of a vertical square shaft, L, on which is secured a circular hub, L′, recessed into the under side of the said head D′, and serving as an upper centering-guide for the said vertical shaft. The lower cylindrical end, L″, of the shaft L is passed freely through a vibrating plate, I, and stepped into the portion

G′ of the base, the said vibrating plate resting upon the said portion G′ of the base.

Mounted upon the vertical shaft L is the vertically-movable and oscillating turn-table or carriage S, which in this instance is composed of two disks connected by suitable blocks, and provided, preferably, with two sets of anti-friction rollers, *s s′*, each set being composed of four rollers adapted to bear upon the sides of the said square shaft L, these rollers being journaled in radial recesses or slots formed in the said disks. As thus constructed and attached to the square shaft L, it will be observed that this turn table S will rotate with the shaft, and at the same time be vertically movable thereon, the anti-friction rollers serving to prevent binding of the parts. Preferably formed integral with and projecting radially from the bottom of the said turn-table S is a lug or lip, U, the lower side of which is convexed, as at *n*, Fig. 4, for a purpose hereinafter explained. This lug U is adapted to play circularly beneath a roller, *a*, journaled on a vertical gravitating arm, *b*, extending up through the base G, the roller *a* and arm *b* being raised a short distance by the said lug whenever it passes under the roller. The lower end of this arm *b* is pivoted to one end of a lever, H, pivoted in a slot in the base G, the other end, H^2, of this lever H being turned up and passed freely through the base and adapted to enter recesses *h h* in the bottom of the vibrating plate I and lock the same in either one of two positions it assumes.

Clips P, fastened to the base G and setting over the flange N, securely attach the plate I to the base, but permit it to vibrate freely a limited distance. The plate I is cut out at one side to form the radial abutments *i i* and *i′ i′*, the former being somewhat higher than the latter. Rollers M M are journaled in slots in the base, one being located on each side of the roller *a* and both projecting slightly above the face of the base. The plate I is also provided with a radial arm, R, which projects through a slot, R′, in the casing D and is attached to the connecting-rod E. To the upper end of the vertical shaft is secured the bifurcated arm W, the forks of which are suitably braced and provided with vertical tappets X. Attached to this arm is a depending chain, *c*, which passes between two grooved rollers, Y, journaled in the head D′, into the chamber A′ on the interior of the cylinder D, and is then attached to a weight, Z.

The operation of this part of my invention is as follows: When it is desired to switch the car B′, going in the direction indicated by the arrow X^3, off upon the siding B, all the engineer or other attendant upon the car has to do is to throw out the arm H′, as shown in Fig. 1, in the manner hereinafter set forth, and the rest of the operation is done automatically. As the car with the protruding arm passes the stand No. 1 the said arm contacts with the vertical tappets X and vibrates the arm W, and this arm in turn partially rotates the vertical shaft L and the turn-table S. As the turn-table rotates with the shaft L, the lug U on the turn-table strikes against one of the lower abutments, *i′*, and rotates the plate I until one of the apertures *h* in the bottom of the same registers with the bolt H^2, when the latter automatically enters the said aperture and locks the plate firmly against further vibration. At this point the lug U rides up upon one of the rollers M, the rounded under surface, *n*, of the former facilitating this, and is stopped by coming in contact with one of the upper abutments, *i*. When the plate I is rotated or vibrated, the switch-rails will be shifted through the medium of the angle-lever and connecting-rods, and when the arm H′ has passed the arm W the latter is brought back to its normal position (shown in Fig. 1) by means of the chain *c* and weight Z. As the arm W returns to its normal position the shaft L will restore the turn-table to its normal position, in which position its lug U will rest under the roller *a*, the plate I remaining unlocked, as shown in Figs. 2 and 3.

The object in locking the vibrating plate I during the rotation of the turn-table, in the manner above described, is to prevent the jar or shock occasioned by the contacting and sudden stopping of the parts from shaking the switch-rails out of alignment directly after they have been shifted by the vibrating plate. As the train passes onto the siding and the switch-rails are thrown back into alignment with the main rails by operation of stand No. 2, in the manner hereinafter described, the operation of the parts through the medium of the connecting-rod E will be reversed, the vibrating plates I of both stands being carried back to their original position. The instant the switch-rails come back into alignment with the main rails the bolt H^2 on stand No. 2 will automatically enter the other recess *h* in the plate I and prevent the same from vibrating further, the turn-table with its lug U having been, of course, first turned out of the way by the rotation of the vertical shaft L. When the arm W again resumes its normal position, the lug U will be again carried back under the roller *a*, thereby holding the plate unlocked free for another operation.

I will now proceed to describe the mechanism for operating the spring-actuated arm H′, attached to the bottom of the car and adapted to be protruded therefrom, this mechanism being illustrated by Figs. 8, 9, 10, 11, 12, and 13.

Preferably at the middle of the length of the bed of the car, and near the sides thereof, I rigidly secure the casings and frames of the mechanism for operating this arm H′, as shown in Fig. 8, and at the ends of the car are suitably journaled cranks or windlasses H^3, connected by means of chains I^2 to a vibrating disk, F^2, to be hereinafter described, these cranks and chains being for the purpose of protruding the arms H′ when it is desired to operate the rail-shifting devices, as will presently appear.

The letter $G^\times$ designates a cylindrical casing

clamped between two stationary plates, C^3 and B^4, and to the bottom of the car by means of suitable bolts passing through perforated ears upon the plates. Passing centrally through the said cylindrical casing $G^\times$ and mounted in the two plates or disks C^3 and B^4 is a vertical pin or bolt, F′, having its upper squared end inserted in a similarly-shaped recess in the said upper plate, C^3, to prevent it (the bolt) from turning. Clamped loosely between the two plates C^3 and B^4 and pivoted on the central bolt, F′, is the vertical spring-actuated disk F^2 and the above-mentioned vibrating spring-actuated arm H′, the disk being recessed on its upper face for the reception of the arm, as will be more fully hereinafter set forth. This arm H′ is held in its normal position with respect to the vibrating disk by means of two V-shaped springs, M′ M′, secured rigidly to the said disk. The longer part, b', of this arm H′ projects out through a slot, X^2, in the casing and its shorter or inner end is provided on its under side with a recess, r', and a lip, r^2.

The lower disk, B^4, is formed with an extension, B^5, projecting from its periphery and provided upon its under side with ears b^7, through which passes the fulcrum-pin b^8 of a pivoted locking-lever, L^4. The shorter or inner arm of this lever is provided with a gravitating weight, K′, and its outer or longer arm is provided with an upturned portion, Z′, which passes up freely through the plate B^4, and is adapted to automatically enter a recess, Z″, in the disk F^2 whenever the arm H′ is protruded from the side of the car, as will more fully hereinafter appear.

The vibrating disk F^2 and its attachments are constructed as follows: This disk has formed upon its upper face two segments, F^3 F^3, forming two radial abutments, f^3 f^3, and recesses for the reception of the spring M′ and arm H′, as shown most clearly in Fig. 10, the recesses for the arm being of sufficient size to permit a free partial rotation of the same around the bolt F′. This disk F^2 is provided upon its under side with a segmental recess forming shoulders p^3 and S^5, and also with a recess, S^6, near its edge, for a purpose hereinafter explained. This disk is also provided with a radial arm or pin, $A^\times$, for the attachment of the above-mentioned chain I^2, this arm $A^\times$ projecting through a slot in the cylindrical casing $G^\times$.

The stationary disk B^4 is provided with a stop, s^4, upon its upper side, which works in the segmental recess in the under side of the vibrating disk F^2 and is adapted to abut against the shoulder p^3. Pivoted in a curved slot, v, formed through the plate B^4, near the outer end of the radial stop s^4, are two triggers, T T, pivoted on pins t^5 and provided with upwardly-extending tails t^3, which latter work in the recess S^6, formed in the under side of the disk F^3, and are adapted to engage at certain determined periods with the recess in the inner end of the arm H′. These triggers are weighted or enlarged at t^4, so that their normal tendency is to fall or tip toward each other, the said weighted portions or toes normally resting upon the upper side of the weighted lever L^4, for a purpose hereinafter set forth. Coiled around a post or pin, p, rising from the upper side of the plate B^4, is a spring, S^7, one limb of which is fastened down to the said plate B^4, and the other free end, N^2, is adapted to press against the radial shoulders S^5, formed upon the under side of the vibrating disk F^2.

The operation of this part of my invention is as follows: When it is desired to protrude one of the arms H′ so that it will operate the rail-shifting device hereinbefore mentioned, all the attendant upon the train has to do is to draw upon one of the chains I^2 by means of one of the cranks H^3. This partially rotates the disk F^2, and this disk in turn carries around the arm H′ to the position shown in Figs. 9, 10, and 11, when the bolt Z′, formed on the outer end of the weighted lever L^4, automatically enters the recess Z″ in the said disk F^2 and holds it in that position until the arm H′ strikes the tappets on the vibrating arm W of the track mechanism. When the arm H′ contacts with the arm W, the former, by reason of the location of the springs M′, is permitted to yield or partially rotate upon the pin F′, this vibration causing its inner end to sweep around far enough for one of the tails of the triggers T to enter the recess r' in the end of the arm, the trigger being tipped up sufficiently for this purpose by the said arm. Now, as the car having the protruding arm passes onward, the instant the said arm is disengaged from the arm W it is thrown back to its normal position, as shown in Fig. 10, by means of one of the springs M′, and this movement of this arm H′ trips the engaged trigger T and forces the lever L^4 down, thus withdrawing the bolt Z′ from the recess in the vibrating plate F^2. The instant the bolt Z′ is disengaged from the spring-actuated plate F^2 this plate, being free to revolve upon the bolt F′, is returned to its normal position by the pressure upon its shoulder S^5 of the free arm N^2 of the spring s^7, this plate F^2 being stopped in its rotation and held in its normal position by the stop s^4 coming in contact with the shoulder p^3. As the disk F^2 returns to its normal position it carries the arm H′ around to its normal position under the car out of the way, as shown at bottom of Fig. 8.

It will be observed that the track-stand No. 2, which is located in the crotch formed by the main track and siding, is provided with a duplicate bifurcated arm, W, both keyed to the same shaft, L, of the rail-shifting mechanism. By this arrangement it will readily be seen that the rail-shifting mechanism located in the crotch can be operated by trains passing either on the siding or main track. Thus, after a car has passed onto the siding, the attendant may throw out the arm H′ upon the opposite side of the car from that last used (the right-hand arm in

this instance) and shift the switch-rails back in alignment with the main rails. This is done as follows: The arm H′ on the car contacts with the tappets X on the left-hand branch of the duplicate arm W and rotates the vertical shaft L in the direction indicated by the small arrow. As this shaft rotates it carries with it the turn-table S, the lug U on this turn table in turn carrying around the vibrating plate I, in the manner hereinbefore described. When the vibrating plate I rotates sufficiently to shift the switch-rails, (through the medium of the connecting-rods E F and angle-lever E′,) the bolt H² on the locking-lever automatically enters one of the recesses *h* and locks the plate against further vibration. Again, where a train has been running "wild" and it is desired to return to the main track in the direction of the arrow X², an attendant on the train may throw out a left-hand arm, and this will shift the switch-rails in alignment with the siding-rails, as is evident.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the switch-rails and connecting-rods, of a vertical shaft, L, provided with an arm, W, a vibrating plate adapted to vibrate about the said shaft, this plate being connected to the connecting-rods of the switch-rails and provided with abutments, and a vertically-movable turn-table upon said vertical shaft, this turn-table being adapted to rotate with the vertical shaft and provided with a lug adapted to contact with the said abutments upon the vibrating plate, substantially as herein set forth.

2. The combination, with the switch-rails and connecting-rods, of a vertical shaft, L, provided with an operating-arm, a chain and weight attached to this arm for restoring it to its normal position, a pivoted vibrating plate connected to the switch-rail-operating rods, and a vibrating carriage or turn-table adapted to operate the said vibrating plate, substantially as herein stated.

3. The combination, with the switch-rails and connecting-rods, of a vertical square shaft provided with an operating-arm, a pivoted vibrating plate connected to the operating-rods of the switch-rails, and a vertically-movable vibrating turn-table mounted upon the said vertical shaft and provided with friction rollers *s s′*, adapted to bear upon the flat sides of the said shaft, the said turn-table being adapted to operate the said vibrating plate, substantially as described.

4. The combination, with the switch-rails and connecting-rods, of a vertical shaft, L, provided with a lateral operating-arm, a pivoted vibrating plate connected to and adapted to operate the said connecting-rods of the switch-rails, a vibrating turn-table mounted upon the said shaft and adapted to operate the said vibrating plate, this turn-table being provided with a radial lug, U, and a pivoted locking-lever, H, provided at one end with a bolt, H², adapted to engage and lock the said vibrating plate, the said locking-lever being provided with a vertical arm and a roller or their equivalents at its other end, all arranged as and for the purpose set forth.

5. The combination, with the switch-rails and connecting-rods, of a base, G, a vertical shaft, L, provided with an operating-arm, a pivoted vibrating plate, I, connecting to the switch-operating rods and provided with radial abutments *i i′*, a vertically-movable vibrating turn-table mounted on the said vertical shaft and provided with a radial lug, U, means, substantially as described, for locking the said vibrating plate, and the rollers M M, journaled in the said base, all arranged substantially as and for the purpose herein set forth.

6. The combination of the vertical pivotal bolt F′, a vibrating spring-actuated disk pivoted upon this bolt, a weighted locking-lever, L⁴, provided with a bolt, Z′, adapted to engage the said vibrating disk, a spring-actuated arm, H′, pivoted on the said bolt F′ and recessed into the said disk, so as to rotate with it, and a draw-chain, I², connected to the said vibrating disk, substantially as herein set forth.

7. The combination of a vertical pivotal bolt, F′, a stationary plate, B⁴, provided with a stop, *s*⁴, the vibrating disk F², shouldered and recessed substantially as described, a spring for actuating this disk, an arm, H′, pivoted upon the said bolt F′ and recessed at *r′*, this arm being adapted to rotate with said disk, springs for actuating this arm, a pivoted locking-lever provided with a bolt adapted to engage and lock the said vibrating disk, and weighted triggers T T, pivoted in a slot in the stationary plate B⁴, as and for the purpose herein set forth.

8. The combination of a vertical pivotal bolt, a vibrating disk pivoted on this bolt, means for rotating this disk, a lever for locking the disk, and a spring-actuated arm, H′, pivoted on the said vertical bolt and engaged by the said vibrating disk, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HARMAN A. SAGE.

Witnesses:

CHAS. D. DAVIS,

JOHN S. FINCH, Jr.